OPTICAL MEMBER AND LIQUID CRYSTAL DISPLAY DEVICE

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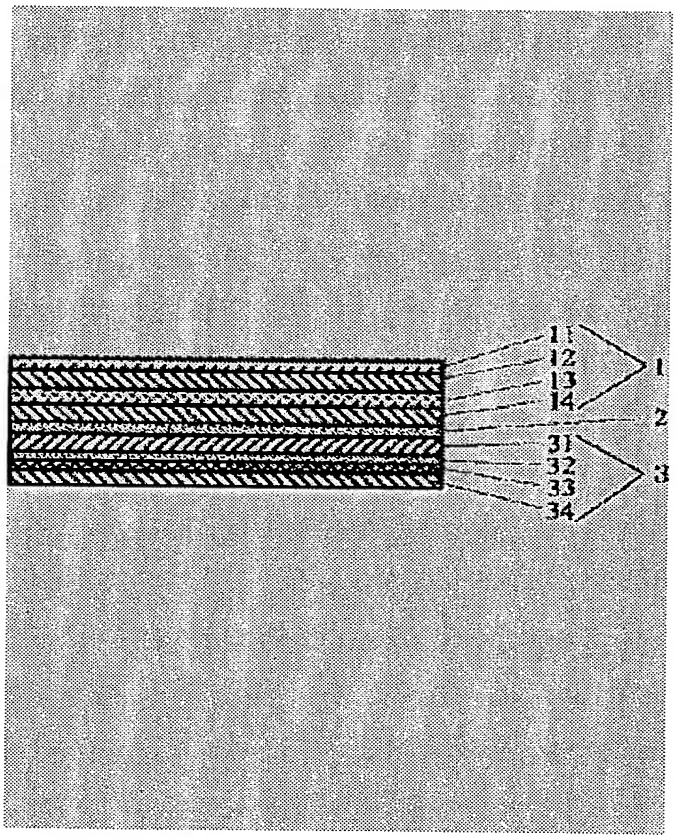
Abstract of **JP2001264535**

PROBLEM TO BE SOLVED: To develop an optical member capable of forming a liquid crystal display device excellent in brightness and contrast and less in coloring at a wide visual field angle in front and diagonal viewing. SOLUTION: The optical member consists of a laminated body of an optical compensation polarizing plate 1 wherein a double refraction layer 11 consisting of a discotic liquid crystal polymer is supported by a transparent protective layer 12 with which a polarizing film 13 is coated and a polarized light separating plate 3 for separating incident natural light into reflected light and transmitted light both consisting of polarized light. The liquid crystal display device is formed by disposing the optical member having the polarizing film positioned between the double refraction layer and the polarized light separating plate on at least one side of a liquid crystal cell via the double refractive layer side. Thereby, the liquid crystal display device capable of thinning its size and enhancing light transmittance and excellent in display quality can be formed.



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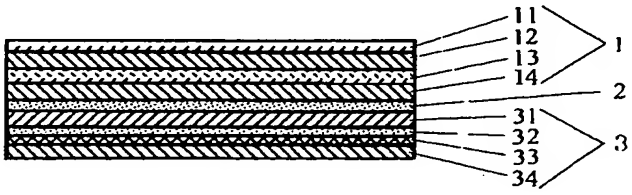
(54)【発明の名称】　光学部材及び液晶表示装置

(57)【要約】
【課題】　正面及び斜視の広い視野角で輝度とコントラストに優れて着色が少ない液晶表示装置を形成しうる光学部材の開発。
【解決手段】　偏光フィルム（１３）を被覆する透明保護層（１２）にてディスコティック液晶ポリマーからなる複屈折層（１１）を支持してなる光学補償偏光板（１）と、入射自然光を偏光からなる反射光と透過光に分離する偏光分離板（３）との積層体よりなる光学部材及び複屈折層と偏光分離板の間に偏光フィルムが位置する前記光学部材をその複屈折層側を介して液晶セルの少なくとも片側に配置してなる液晶表示装置。
【効果】　薄型化と共に光透過率を向上でき表示品位に優れる液晶表示装置を形成できる。



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【特許請求の範囲】

【請求項１】　偏光フィルムを被覆する透明保護層にてディスコティック液晶ポリマーからなる複屈折層を支持してなる光学補償偏光板と、入射自然光を偏光からなる反射光と透過光に分離する偏光分離板との積層体よりなることを特徴とする光学部材。

【請求項２】　請求項１において、光学補償偏光板がヨウ素又は二色性染料含有のポリビニルアルコール系延伸フィルムからなる偏光フィルムを被覆するセルロース系フィルムからなる透明保護層の外側に複屈折層を有するものよりなる光学部材。

【請求項３】　請求項１又は２において、偏光分離板が透明基材の片側又は両側に１層又は２層以上のコレステリック液晶ポリマー層を付設してなる円偏光分離板と１／４波長板よりなるものである光学部材。

【請求項４】　請求項１～３において、光学補償偏光板と偏光分離板を粘着層を介し接着してなる光学部材。

【請求項５】　複屈折層と偏光分離板の間に偏光フィルムが位置する請求項１～４に記載の光学部材をその複屈折層側を介して液晶セルの少なくとも片側に配置してなることを特徴とする液晶表示装置。

【発明の詳細な説明】

【０００１】

【発明の技術分野】本発明は、正面及び斜視の広い視野角で輝度とコントラストに優れて着色が少ない液晶表示装置を形成しうる光学部材に関する。

【０００２】

【発明の背景】従来、入射自然光を偏光からなる反射光と透過光に分離する偏光分離板（特開昭５９－１２７０１９号公報、特開昭６１－１２２６２６号公報、特開昭６３－１２１８２１号公報、特開平３－４５９０６号公報等）、及びディスコティック液晶ポリマーからなる複屈折層を透明基材で支持してなる光学補償板（特開平６－２１４１１６号公報）が知られていた。前記によれば偏光分離板と光学補償板を偏光板と積層して光学部材とし、それをバックライトを形成するサイドライト型導光板の上に配置して偏光分離板を介した直線偏光を偏光板に供給して吸収ロスを抑制すると共に、光学補償板を介し液晶セルの複屈折性による位相差を補償して輝度と視野角に優れる液晶表示装置を得ることが期待される。

【０００３】しかしながら、前記した従来の偏光分離板と偏光板と光学補償板からなる光学部材では、光透過率の低下が大きいと共に、正面や斜視方向における視認において色相が大きく変化（着色）する問題点があった。

【０００４】

【発明の技術的課題】本発明は、正面及び斜視の広い視野角で輝度とコントラストに優れて着色が少ない液晶表示装置を形成しうる光学部材の開発を課題とする。

【０００５】

【課題の解決手段】本発明は、偏光フィルムを被覆する

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透明保護層にてディスコティック液晶ポリマーからなる複屈折層を支持してなる光学補償偏光板と、入射自然光を偏光からなる反射光と透過光に分離する偏光分離板との積層体よりなることを特徴とする光学部材及び複屈折層と偏光分離板の間に偏光フィルムが位置する前記光学部材をその複屈折層側を介して液晶セルの少なくとも片側に配置してなることを特徴とする液晶表示装置を提供するものである。

【０００６】

【発明の効果】本発明の光学部材によれば、偏光フィルムの透明保護層とディスコティック液晶ポリマー層の支持基材の兼用化、従って従来の光学補償板における支持用の透明基材の省略で、薄型化と共に光透過率を向上させることができ、しかも正面や斜視方向での視認による着色を大幅に抑制することができる。その結果、輝度の向上を図りつつ着色を抑制して正面及び斜視の広い視野角で輝度やコントラスト等の表示品位に優れる液晶表示装置を形成することができる。

【０００７】

【発明の実施形態】本発明による光学部材は、偏光フィルムを被覆する透明保護層にてディスコティック液晶ポリマーからなる複屈折層を支持してなる光学補償偏光板と、入射自然光を偏光からなる反射光と透過光に分離する偏光分離板との積層体よりなる。その例を図１に示した。１が光学補償偏光板、３が偏光分離板であり、２は必要に応じての粘着層である。

【０００８】光学補償偏光板としては、図例の如く偏光フィルム１３を被覆する透明保護層１２にてディスコティック液晶ポリマーからなる複屈折層１１を支持して、偏光フィルムの透明保護層とディスコティック液晶ポリマー層の支持基材とを兼用化したものが用いられる。

【０００９】前記の偏光フィルムには、所定偏光軸の直線偏光を透過して他の光は吸収する適宜なものを用いることができ、その種類について特に限定はない。ちなみにその例としては、ポリビニルアルコール系フィルムや部分ホルマール化ポリビニルアルコール系フィルム、エチレン・酢酸ビニル共重合体系部分ケン化フィルムの如き親水性高分子フィルムにヨウ素及び／又は二色性染料を吸着させて延伸処理したもの、ポリビニルアルコールの脱水処理物やポリ塩化ビニルの脱塩酸処理物の如きポリエン配向のフィルムなどがあげられる。就中、偏光度の高さなどの点よりヨウ素及び／又は二色性染料含有のポリビニルアルコール系延伸フィルムからなる偏光フィルムが好ましく用いられる。

【００１０】一方、図例の如く偏光フィルム１３の片側又は両側を被覆して偏光フィルムを保護する透明保護層１２、１４は、適宜な透明ポリマーにて形成することができる。就中、透明性や機械的強度、熱安定性や水分遮蔽性等に優れるポリマーが好ましく用いうる。ちなみにその例としては、二酢酸セルロースや三酢酸セルロース

の如きセルロース系ポリマー、ポリエチレンテレフタレートやポリエチレンナフタレートの如きポリエステル系ポリマー、ポリカーボネート系ポリマーやポリメチルメタクリレートの如きアクリル系ポリマー、ポリスチレンやアクリロニトリル・スチレン共重合体の如きスチレン系ポリマー、ポリエチレンやポリプロピレン、シクロ系ないしノルボルネン構造を有するポリオレフィンやエチレン・プロピレン共重合体の如きオレフィン系ポリマー、塩化ビニル系ポリマー、ナイロンや芳香族ポリアミドの如きアミド系ポリマーがあげられる。

【００１１】またイミド系ポリマーやスルホン系ポリマー、ポリエーテルスルホン系ポリマーやポリエーテルエーテルケトン系ポリマー、ポリフェニレンスルフィド系ポリマーやビニルアルコール系ポリマー、塩化ビニリデン系ポリマーやビニルブチラール系ポリマー、アリレート系ポリマーやポリオキシメチレン系ポリマー、エポキシ系ポリマーや前記ポリマーのブレンド物、あるいはポリエステル系やアクリル系、ウレタン系やアミド系、シリコーン系やエポキシ系等の熱や紫外線照射等で硬化するポリマーなども前記透明保護層の形成に用いうる。着色の抑制等の点より好ましい透明保護層は、セルロース系フィルムの如く等方性に優れるものである。透明保護層は、ポリマー液の塗布方式やフィルムとしたものの接着積層方式などの適宜な方式で形成することができる。

【００１２】光学補償偏光板は、上記した偏光フィルムを被覆する透明保護層にてディスコティック液晶ポリマーからなる複屈折層を支持したものであるが、その形態は通例、図例の如く偏光フィルムを被覆する片側の透明保護層１２の外側に当該複屈折層１１を有するものとされる。

【００１３】光学補償偏光板の形成は、偏光フィルムを被覆する透明保護層に当該複屈折層を付設する方式にても行いうるし、透明保護層を形成するためのフィルムに当該複屈折層を付設し、そのフィルムを偏光フィルムに接着する方式にても行うことができる。なおディスコティック液晶ポリマーからなる複屈折層の形成は、液晶ポリマーの溶液を配向膜上に塗工する方式などの従来に準じた方式にて行うことができる。

【００１４】偏光分離板としては、自然光を入射させた場合に所定偏光方向の直線偏光又は所定方向の円偏光を反射し、他の光は透過する特性を示す適宜なものを用いうる。ちなみにその例としては、誘電体の多層薄膜や屈折率異方性が相違する薄膜フィルムの多層積層体の如き、所定偏光方向の直線偏光を透過して他の光は反射する特性を示す直線偏光分離板、コレステリック液晶層の如き左右一方の円偏光を反射して他の光は透過する特性を示す円偏光分離板などがあげられる。

【００１５】かかる反射・透過特性を示す偏光分離板を用いることにより、バックライト等の光源からの光を入射させて所定偏光状態の透過光を得、それを偏光板に吸収されにくい状態で供給して液晶表示等に利用しうる光量の増大を図って輝度を向上させることができる。またその場合に偏光分離板による反射光を反射層等を介し反転させて偏光分離板に再入射させると、その一部又は全部が所定偏光状態の光として透過しうることより、その反射光を利用して偏光分離板を透過する光を増量させて液晶表示等の輝度をより向上させることができる。

【００１６】前記のコレステリック液晶からなる円偏光分離板は、液晶ポリマーの配向フィルムなどとして得ることもできるが、一般には図例の如く透明基材３４の上にラビング処理等による配向膜を介してグランジャン配向させた液晶ポリマー層３３として得られる。その場合、コレステリック液晶ポリマー層は透明基材の片側又は両側に１層又は２層以上を設けることができる。

【００１７】前記において２層以上のコレステリック液晶ポリマー層を設ける場合には、グランジャン配向の螺旋ピッチが相違するもの、従って反射波長が相違するものの組合せとすることが好ましい。かかる組合せによる重畳化にて反射の波長域を拡大でき可視光域等の広い波長範囲で円偏光を反射するものを得ることができて、それに基づき広い波長範囲の透過円偏光を得ることができる。

【００１８】コレステリック液晶ポリマー層の重畳層は、重ね塗り方式などにて形成することができる。なおグランジャン配向の螺旋ピッチが相違するコレステリック液晶ポリマー層の重畳に際しては、光利用効率の向上、ひいては輝度向上の点よりその螺旋ピッチが大小の順序通りとなるように重畳することが好ましい。またコレステリック液晶ポリマー層を支持する透明基材には上記の透明保護層で例示したポリマーなどからなる適宜なものを用いうる。

【００１９】前記において円偏光分離板は、円偏光を提供するものであることより、その円偏光を直線偏光化することを目的に１／４波長板との組合せで用いることもできる。すなわち図例の如く円偏光分離層３３による円偏光を１／４波長板３１にて直線偏光化し、その直線偏光の振動面に対し偏光フィルム１３の透過軸が可及的に一致するように光学補償偏光板１を配置することにより偏光フィルムによる吸収ロスを防止してより輝度を高めることができる。従って図例の如く１／４波長板３１は、光学補償偏光板１と円偏光分離層３３の間に配置される。

【００２０】前記の１／４波長板としては、上記の透明保護層で例示したポリマーの延伸フィルム等からなる複屈折性フィルム、ネマチック系等の液晶ポリマーの配向フィルム、その配向液晶層を透明基材上に支持したものなどの従来に準じた適宜なものを用いうる。可視光域等の広い波長範囲で１／４波長板として機能するものは、例えば波長５５０nmの光等の単色光に対して１／４波長板として機能する位相差層と他の位相差特性を示す位相

差層、例えば１／２波長板として機能する位相差層とを重畳する方式などにより得ることができる。従って１／４波長板は、１層又は２層以上の位相差層からなるものであってよい。

【００２１】前記の延伸フィルムは、一軸や二軸等の適宜な方式で処理したものであってよく、熱収縮性フィルムとの接着下に収縮力又は／及び延伸力を付与する方式等にてフィルムの厚さ方向の屈折率を制御した複屈折性フィルムなどであってもよい。なお円偏光分離板が上記したコレステリック液晶層をその螺旋ピッチが大小の順序通りとなるように重畳したものからなる場合には、その重畳体の螺旋ピッチが小さい側に１／４波長板を配置することが斜視による着色低減等の点より好ましい。

【００２２】本発明による光学部材は、光学補償偏光板と偏光分離板を単に重ね置いたものであってもよいが、好ましくは光軸のズレ防止による品質の安定化や液晶表示装置の組立効率の向上などを目的に、図例の如く光学補償偏光板１と偏光分離板３を粘着層２を介し接着して積層一体化したものである。また１／４波長板３１を有する場合には、それも粘着層３２を介し円偏光分離板に接着して積層一体化することが好ましい。

【００２３】前記した粘着層の形成には、例えばアクリル系重合体やシリコーン系ポリマー、ポリエステルやポリウレタン、ポリエーテルや合成ゴムなどの適宜なポリマーをベースポリマーとする粘着剤などの適宜な粘着性物質を用いうる。就中アクリル系粘着剤の如く光学的透明性や耐候性、耐熱性等に優れて熱や湿度の影響で浮きや剥がれ等を生じにくいものが好ましく用いうる。

【００２４】ちなみに前記したアクリル系粘着剤の例としては、メチル基やエチル基やブチル基等の炭素数が２０以下のアルキル基を有する（メタ）アクリル酸のアルキルエステルと、（メタ）アクリル酸や（メタ）アクリル酸ヒドロキシエチル等の改良成分からなるアクリル系モノマーを、ガラス転移温度が０℃以下となる組合せにて共重合してなる、重量平均分子量が１０万以上のアクリル系重合体をベースポリマーとするものなどがあげられるが、これに限定されない。

【００２５】粘着層は、それに透明粒子を含有させて光拡散性を示すものとすることもできる。その透明粒子には例えばシリカやアルミナ、チタニアやジルコニア、酸化錫や酸化インジウム、酸化カドミウムや酸化アンチモン等からなる、導電性のこともある無機系粒子、架橋又は未架橋のポリマー等からなる有機系粒子などの適宜なものを１種又は２種以上用いうる。

【００２６】粘着層は、例えば粘着性物質をカレンダーロール法等による圧延方式、ドクターブレード法やグラビアロールコータ法等による塗工方式などの適宜な方式で光学補償偏光板や偏光分離板等の接着面に付設する方式、あるいはセパレータ上に前記に準じ粘着層を形成してそれを所定の接着面に移着する方式などの適宜な方式

で行うことができる。なお光学部材の外表面にも必要に応じ液晶セル等の他部材との接着を目的とした粘着層を設けることができる。その粘着層が表面に露出する場合には実用に供するまでの間、汚染防止等の保護を目的にその表面をセパレータなどで仮着カバーしておくこともできる。

【００２７】本発明による光学部材は、従来に準じた各種の用途に用いうる。特に液晶表示装置における輝度の向上と視野角の拡大などに好ましく用いうる。その液晶表示装置は、例えば図例の如く複屈折層１１と偏光分離板３の間に偏光フィルム１３が位置する光学部材をその複屈折層側を介して液晶セルの少なくとも片側に配置する方式などにより形成することができる。従って光学部材は、複屈折層１１が偏光フィルムと液晶セルの間に位置するように配置される。

【００２８】液晶表示装置の形成に際しては、任意な液晶セルを用いることができ、例えば薄膜トランジスタ型に代表されるアクティブマトリクス駆動型のもの、ＴＮ型やＳＴＮ型に代表される単純マトリクス駆動型のもの、カラーフィルタを付設したものなどの適宜なタイプの液晶セルを使用して種々の液晶表示装置を形成することができる。また液晶表示装置には、例えば反射防止シートや防眩シート、光拡散シート、プリズムシートやレンズシート等の集光シート、バックライトなどの、液晶表示装置の形成に用いられる適宜な光学シートの１種又は２種以上を適宜な位置に配置することができる。

【００２９】

【実施例】実施例１

ディスコティック液晶ポリマーからなる複屈折層を設けた三酢酸セルロースフィルムをその複屈折層が外側となるようにヨウ素含有のポリビニルアルコール系延伸フィルムからなる偏光フィルムの片側に貼着し、偏光フィルムの他方側に三酢酸セルロースフィルムを貼着して光学補償偏光板を得た。一方、三酢酸セルロースフィルムの上にラビング配向膜を介し反射中心波長が７６０nm、６５０nm、５５０nm又は４３０nmのコレステリック液晶ポリマーを重畳塗布し配向処理して４層構造の円偏光分離板を形成し、それにアクリル系粘着層を介しポリカーボネートからなる１／４波長板を接着して偏光分離板を得た。ついで前記光学補償偏光板の複屈折層を有しない側にアクリル系粘着層を介し偏光分離板をその１／４波長板側を介し接着積層して光学部材を得た。

【００３０】比較例１

光学補償偏光板に代えて、偏光フィルムの両側に三酢酸セルロースフィルムを貼着してなる偏光板の片面に、三酢酸セルロースフィルムにディスコティック液晶ポリマーからなる複屈折層を設けてなる光学補償板をその複屈折層が外側となるようにアクリル系粘着層を介し接着積層したものを用いたほかは実施例１に準じて光学部材を得た。

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【００３１】比較例２

ディスコティック液晶ポリマーからなる複屈折層を省略したほかは実施例１に準じて光学部材を得た。

【００３２】評価試験

実施例、比較例で得た光学部材の厚さ、光透過率、色相ｂ（ＮＢＳ）、視野角及び輝度向上率を調べた。なお視野角は、液晶表示装置とした場合におけるコントラスト＊

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＊比が１０：１以上の視野領域に基づいて評価した。また輝度向上率は、両側に偏光板を有する液晶セルをバックライト上に配置した場合の輝度を基準として、そのバックライト側の偏光板を実施例、比較例で得た光学部材に置換した場合の輝度を調べて評価した。

【００３３】前記の結果を次表に示した。

	厚さ（μｍ）	光透過率	色相ｂ	視野角	輝度向上率
実施例１	４３０	４３．９％	４．８９	１２０度	１４６％
比較例１	５５５	４３．４％	５．３１	１２０度	１４３％
比較例２	４２５	４４．２％	４．８７	９０度	１４９％

【００３４】表より、実施例では輝度と視野角の向上を図りつつ薄型化と光透過率の向上が達成され、かつ偏光分離板を用いない場合（比較例２）にほぼ匹敵する少ない着色が達成されていることがわかる

【図面の簡単な説明】

【図１】実施例の断面図

【符号の説明】

１：光学補償偏光板

１１：複屈折層

１２、１４：透明保護層

１３：偏光フィルム

２：粘着層

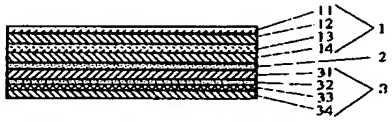
３：偏光分離板

３１：１／４波長板

３３：コレステリック液晶ポリマー層

３４：透明基材

【図１】



フロントページの続き

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FA26X FA26Z FA41Z FB02
JA01 LA16 LA17 LA19

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the optical member in which it excels in brightness and contrast with a transverse plane and the large angle of visibility of strabism, and coloring can form few liquid crystal displays.
[0002]
[Background of the Invention] Conventionally, the polarization division plates (JP,59-127019,A, JP,61-122626,A, JP,63-121821,A, JP,3-45906,A, etc.) which divide the incidence natural light into the reflected light which consists of polarization, and the transmitted light, and the optical compensating plate (JP,6-214116,A) which comes to support the birefringence layer which consists of a discotheque liquid crystal polymer with a transparence base material were known. While according to the above supplying the linearly polarized light which carried out the laminating to the optical member by having used the polarization division plate and the optical compensating plate as the polarizing plate, has arranged it on the side light mold light guide plate which forms a back light, and minded the polarization division plate to a polarizing plate and controlling an absorption loss, obtaining the liquid crystal display which compensates the phase contrast by the form birefringence of a liquid crystal cell through an optical compensating plate, and is excellent in brightness and an angle of visibility is expected.
[0003] However, in the optical member which consists of the above mentioned conventional polarization division plate and the above mentioned polarizing plate, and an optical compensating plate, while decline in light transmittance was large, there was a trouble that a hue changed a lot in the check by looking in a transverse plane or the direction of strabism (coloring).
[0004]
[The technical technical problem of invention] This invention makes a technical problem development of the optical member in which it excels in brightness and contrast with a transverse plane and the large angle of visibility of strabism, and coloring can form few liquid crystal displays.
[0005]
[Means for Solving the Problem] The optical compensation polarizing plate with which this invention comes to support the birefringence layer which consists of a discotheque liquid crystal polymer in the transparent protection layer which covers a polarization film, As the optical member and birefringence layer which are characterized by consisting of a layered product with the polarization division plate which divides the incidence natural light into the reflected light which consists of polarization, and the transmitted light, between polarization division plates The liquid crystal display characterized for said optical member in which a polarization film is located by the thing of a liquid crystal cell which it comes to arrange in one side at least through the birefringence layer side is offered.
[0006]
[Effect of the Invention] According to the optical member of this invention, by the abbreviation of the transparence base material for support in combination-izing of the support base material of the

transparent protection layer of a polarization film, and a discotheque liquid crystal polymer layer, therefore the conventional optical compensating plate, light transmittance can be raised with thin shape-ization and, moreover, coloring by check by looking in a transverse plane or the direction of strabism can be controlled sharply. Consequently, the liquid crystal display which controls coloring and is excellent in display grace, such as brightness and contrast, with a transverse plane and the large angle of visibility of strabism can be formed, aiming at improvement in brightness.

[0007]

[Embodiment of the Invention] The optical member by this invention consists of a layered product of the optical compensation polarizing plate which comes to support the birefringence layer which consists of a discotheque liquid crystal polymer in the transparent protection layer which covers a polarization film, and the polarization division plate which divides the incidence natural light into the reflected light which consists of polarization, and the transmitted light. The example was shown in drawing 1 . 1 is an optical compensation polarizing plate, 3 is a polarization division plate, and 2 is an adhesive layer as occasion demands.

[0008] What combination-ized the support base material of the transparent protection layer of a polarization film and a discotheque liquid crystal polymer layer as an optical compensation polarizing plate in support of the birefringence layer 11 which consists of a discotheque liquid crystal polymer by the transparent protection layer 12 which covers the polarization film 13 like the example of drawing is used.

[0009] The linearly polarized light of a predetermined polarization shaft can be penetrated on the aforementioned polarization film, other light can use the proper thing to absorb for it, and there is especially no limitation in it about the class. Incidentally as the example, the film of the polyene orientation like the thing and the dehydration processing object of polyvinyl alcohol which iodine and/or dichromatic dye were made to stick to the hydrophilic high polymer film like a polyvinyl alcohol system film, a partial formal-ized polyvinyl alcohol system film, and an ethylene-vinylacetate copolymer system partial saponification film, and carried out extension processing, or the demineralization acid-treatment object of a polyvinyl chloride etc. is raised. Above all, the polarization film which consists of iodine and/or a polyvinyl alcohol system oriented film of dichromatic dye content from points, such as height of degree of polarization, is used preferably.

[0010] On the other hand, the transparent protection layer 12 and 14 which covers one side or the both sides of the polarization film 13, and protects a polarization film can be formed in a proper transparence polymer like the example of drawing. Above all, the polymer which is excellent in transparency, a mechanical strength and thermal stability, moisture electric shielding nature, etc. can use preferably. Incidentally as the example, the cellulose system polymer like diacetyl cellulose or a cellulose triacetate, The polyester system polymer like polyethylene terephthalate or polyethylenenaphthalate, A polycarbonate system polymer and the acrylic polymer like polymethylmethacrylate, Polystyrene and the styrene system polymer like an acrylonitrile styrene copolymer, An olefin system polymer, a vinyl chloride system polymer, and nylon and the amide system polymer like aromatic polyamide like polyolefine or ethylene propylene rubber that have polyethylene, polypropylene, a cyclo system, or norbornene structure are raised.

[0011] Moreover, the polymer hardened by heat, UV irradiation, etc., such as the blend object of an imide system polymer, a sulfone system polymer, a polyether sulphone system polymer and a polyether ether ketone system polymer, a polyphenylene sulfide system polymer and a vinyl alcohol system polymer, a vinylidene-chloride system polymer and a vinyl butyral system polymer, an ant rate system polymer and a polyoxymethylene system polymer, an epoxy system polymer, or said polymer or a polyester system, acrylic, an urethane system and an amide system, a silicone system, and an epoxy system, can be used for formation of said transparent protection layer. Transparent protection layer more desirable than points, such as control of coloring, is excellent in isotropy like a cellulose system film. Although transparent protection layer considered as the spreading method and film of polymer liquid, it can be formed by the method with a proper adhesion laminating method etc.

[0012] Although an optical compensation polarizing plate supports the birefringence layer which consists

of a discotheque liquid crystal polymer in the transparent protection layer which covers the above-mentioned polarization film, the gestalt shall have the birefringence layer 11 concerned like the example of drawing usually on the outside of the transparent protection layer 12 of one side which covers a polarization film.

[0013] The birefringence layer concerned can be attached to the film for the method which attaches the birefringence layer concerned to the transparent protection layer which covers a polarization film also performing formation of an optical compensation polarizing plate, and forming Japanese lacquer and transparent protection layer, and the method pasted up on a polarization film can also perform the film. In addition, the method according to the former, such as a method which carries out coating of the solution of a liquid crystal polymer on the orientation film, can perform formation of the birefringence layer which consists of a discotheque liquid crystal polymer.

[0014] As a polarization division plate, when incidence of the natural light is carried out, the linearly polarized light of the predetermined polarization direction or the circular polarization of light of the predetermined direction is reflected, and other light can use the proper thing which shows the property to penetrate. Incidentally, as the example, the linearly polarized light of the predetermined polarization direction like the multilayer layered product of the thin film film from which the multilayered film and refractive-index anisotropy of a dielectric are different is penetrated, other light reflects the circular polarization of light of the method of Uichi Hidari like the linearly polarized light division plate which shows the property to reflect, and a cholesteric-liquid-crystal layer, and the circular polarization of light division plate which shows the property which other light penetrates is raised.

[0015] By using the polarization division plate which shows this reflection / transparency property, increase of the quantity of light which is made to carry out incidence of the light from the light source of a back light etc., obtains the transmitted light of a predetermined polarization condition, supplies it in the condition that a polarizing plate is hard to be absorbed, and can be used for a liquid crystal display etc. can be aimed at, and brightness can be raised. Moreover, if the reflected light by the polarization division plate is reversed through a reflecting layer etc. in that case and re-incidence is carried out to a polarization division plate, from the part's or all penetrating as a light of a predetermined polarization condition, the quantity of the light which penetrates a polarization division plate using the reflected light can be made to be able to increase, and brightness, such as a liquid crystal display, can be raised more.

[0016] The circular polarization of light division plate which consists of the aforementioned cholesteric liquid crystal is obtained as a liquid crystal polymer layer 33 which generally carried out GURANJAN orientation through the orientation film by rubbing processing etc. on the transparence base material 34 like the example of drawing, although it can also obtain as an oriented film of a liquid crystal polymer etc. In that case, a cholesteric-liquid-crystal polymer layer can prepare one layer or more than two-layer in one side or the both sides of a transparence base material.

[0017] When preparing the cholesteric-liquid-crystal polymer layer more than two-layer in the above, although the thing from which the spiral pitch of GURANJAN orientation is different, therefore reflected wave length are different, considering as combination is desirable. What can expand a reflective wavelength region by superposition-ization by this combination, and reflects the circular polarization of light in the large wavelength range, such as a light region, can be obtained, and the transparency circular polarization of light of the large wavelength range can be acquired based on it.

[0018] The superposition layer of a cholesteric-liquid-crystal polymer layer can be formed by a two coats method etc. In addition, it is desirable to superimpose on the occasion of superposition of the cholesteric-liquid-crystal polymer layer from which the spiral pitch of GURANJAN orientation is different, so that the spiral pitch may consist of a point of the improvement in efficiency for light utilization, as a result the improvement in brightness as large and small sequence. Moreover, the proper thing which consists of a polymer illustrated by the above-mentioned transparent protection layer can be used for the transparence base material which supports a cholesteric-liquid-crystal polymer layer.

[0019] In the above, a circular polarization of light division plate can also be used in combination with a quarter-wave length plate from it being what offers the circular polarization of light for the purpose of

linearly-polarized-light-izing the circular polarization of light. That is, like the example of drawing, the circular polarization of light by the circular polarization of light detached core 33 is linearly-polarized-light-ized with the quarter-wave length plate 31, by arranging the optical compensation polarizing plate 1 so that the transparency shaft of the polarization film 13 may be as much as possible in agreement to the plane of vibration of the linearly polarized light, the absorption loss by the polarization film can be prevented and brightness can be raised more. Therefore, the quarter-wave length plate 31 is arranged like the example of drawing between the optical compensation polarizing plate 1 and the circular polarization of light detached core 33.

[0020] The proper thing according to the former, such as what supported the oriented film of liquid crystal polymers, such as a form birefringence film which consists of an oriented film of the polymer illustrated by the above-mentioned transparent protection layer etc. as the aforementioned quarter-wave length plate, and a nematic system, and its orientation liquid crystal layer on the transparence base material, can be used. What functions as a quarter-wave length plate in the large wavelength range, such as a light region, can be obtained with the method which superimposes the phase contrast layer which shows the phase contrast layer which functions as a quarter-wave length plate to the homogeneous lights, such as light with a wavelength of 550nm, and other phase contrast properties, for example, the phase contrast layer which functions as 1/2 wavelength plate. Therefore, a quarter-wave length plate may consist of a phase contrast layer more than one layer or two-layer.

[0021] The aforementioned oriented film may be a form birefringence film which controlled the refractive index of the thickness direction of a film by the method which may process by the method with proper one shaft, two shafts, etc., and gives a shrinkage force or/and the extension force to the bottom of adhesion with a heat shrink nature film. In addition, when consisting of what superimposed the cholesteric-liquid-crystal layer which the circular polarization of light division plate described above so that the spiral pitch might become as large and small sequence, it is more desirable than points, such as coloring reduction by strabism, to arrange a quarter-wave length plate to a side with the small spiral pitch of the superposition object.

[0022] Although an optical compensation polarizing plate and a polarization division plate may only be piled up and the optical member by this invention may place them, preferably, for the purpose of stabilization of quality, improvement in the assembly effectiveness of a liquid crystal display, etc. by gap prevention of an optical axis, like the example of drawing, it pastes up the optical compensation polarizing plate 1 and the polarization division plate 3 through an adhesive layer 2, and carries out laminating unification. Moreover, when it has the quarter-wave length plate 31, it is desirable to paste a circular polarization of light division plate, and to carry out the laminating unification also of it through an adhesive layer 32.

[0023] Proper slime, such as a binder which makes a base polymer proper polymers, such as for example, an acrylic polymer, a silicone system polymer and polyester, polyurethane and a polyether, and synthetic rubber, can be used for formation of the above mentioned adhesive layer. What is excellent in optical transparency, weatherability, thermal resistance, etc., and can produce neither a float nor peeling easily due to the effect of heat or humidity can use preferably like an acrylic binder above all.

[0024] As an example of the acrylic binder incidentally described above The alkyl ester of the acrylic acid with which carbon numbers, such as a methyl group, an ethyl group, and butyl, have 20 or less alkyl group (meta), (Meta) Although that to which the weight average molecular weight which comes to copolymerize the acrylic monomer which consists of amelioration components, such as an acrylic acid and acrylic-acid (meta) hydroxyethyl, in the combination from which glass transition temperature becomes 0 degree C or less makes 100,000 or more acrylic polymers a base polymer is raised It is not limited to this.

[0025] An adhesive layer shall make it contain a transparence particle, and shall show optical diffusibility. proper things, such as an organic system particle which turns into the transparence particle from a silica, an alumina, a titania and a zirconia, tin oxide and indium oxide, cadmium oxide, antimony oxide, etc. and which a conductive thing also becomes from the polymer for which a bridge is not constructed [a certain inorganic system particle, bridge formation, or], -- one sort -- or two or more sorts can be used.

[0026] A method with proper method which attaches slime to adhesion sides, such as an optical compensation polarizing plate and a polarization division plate, by the method with the proper coating method by the rolling method by the calendering roll method etc., the doctor blade method, the gravure roll coater method, etc. or method which forms an adhesive layer according to the above on a separator, and carries out transfer of it to a predetermined adhesion side etc. can perform an adhesive layer. In addition, the adhesive layer aiming at adhesion with other members, such as a liquid crystal cell, can be prepared also in the outside surface of an optical member if needed. Tentative installation covering of the front face can also be carried out with a separator etc. for the purpose of protection of a pollution control etc. until it presents practical use, when the adhesive layer is exposed to a front face.
[0027] The optical member by this invention can be used for various kinds of applications according to the former. It can use for improvement in brightness, expansion of an angle of visibility, etc. especially in a liquid crystal display preferably. The liquid crystal display can form [like for example, the example of drawing] the optical member in which the polarization film 13 is located through the birefringence layer side with the method of a liquid crystal cell arranged in one side at least between the birefringence layer 11 and the polarization division plate 3. Therefore, an optical member is arranged so that the birefringence layer 11 may be located between a polarization film and a liquid crystal cell.
[0028] On the occasion of formation of a liquid crystal display, various liquid crystal displays can be formed using a liquid crystal cell proper type [, such as a thing of the active-matrix drive mold which can use arbitrary liquid crystal cells, for example, is represented by the thin film transistor mold, a thing of the passive-matrix drive mold represented by TN mold and the STN mold, and a thing that attached the color filter,]. Moreover, in a liquid crystal display, two or more sorts can be arranged in one sort of the proper optical sheet used for formation of a liquid crystal display of condensing sheets, such as for example, an acid-resisting sheet, an anti-dazzle sheet, an optical diffusion sheet, a prism sheet, and a lens sheet, a back light, etc., or a proper location.
[0029]
[Example] The triacetic-acid cellulose film which prepared the birefringence layer which consists of an example 1 discotheque liquid crystal polymer was stuck on one side of the polarization film which consists of a polyvinyl alcohol system oriented film of iodine content so that the birefringence layer might serve as an outside, the triacetic-acid cellulose film was stuck on the other side of a polarization film, and the optical compensation polarizing plate was obtained. On the other hand, the quarter-wave length plate which carries out superposition spreading of the cholesteric-liquid-crystal polymer whose reflective core wavelength is 760nm, 650nm, 550nm, or 430nm, carries out orientation processing, forms the circular polarization of light division plate of 4 layer structures, and becomes it from a polycarbonate through an acrylic adhesive layer through the rubbing orientation film was pasted up on the triacetic-acid cellulose film, and the polarization division plate was obtained. Subsequently, the adhesion laminating of the polarization division plate was carried out to the side which does not have the birefringence layer of said optical compensation polarizing plate through the quarter-wave length plate side through the acrylic adhesive layer, and the optical member was obtained.
[0030] What carried out the adhesion laminating of the optical compensating plate which comes to prepare the birefringence layer which becomes a triacetic-acid cellulose film from a discotheque liquid crystal polymer to one side of the polarizing plate which comes to stick a triacetic-acid cellulose film on the both sides of a polarization film through the acrylic adhesive layer so that the birefringence layer might serve as an outside was used, and also it replaced with the example of comparison 1 optical compensation polarizing plate, and the optical member was obtained according to the example 1.
[0031] The birefringence layer which consists of an example of comparison 2 discotheque liquid crystal polymer was omitted, and also the optical member was obtained according to the example 1.
[0032] The thickness, the light transmittance, Hue b (NBS), the angle of visibility, and the rate of the improvement in brightness of the optical member obtained in the evaluation trial example and the example of a comparison were investigated. In addition, the contrast ratio at the time of considering as a liquid crystal display evaluated the angle of visibility based on 10:1 or more visual field fields. Moreover,

the rate of the improvement in brightness investigated and evaluated the brightness at the time of permuting by the optical member which obtained the polarizing plate by the side of the back light in the example and the example of a comparison on the basis of the brightness in the case of having arranged the liquid crystal cell which has a polarizing plate on both sides on a back light.
[0033] The aforementioned result was shown in degree table.
Thickness (micrometer) 90 degrees [[149%] 0034] Light transmittance Hue b Angle of visibility Rate of the improvement in brightness Example 1 430 43.9% 4.89 120 degrees 146% Example 1 of a comparison 555 43.4% 5.31 120 degrees 143% Example 2 of a comparison 425 44.2% 4.87 In the example, a table shows that little coloring which matches mostly is attained, when improvement in thin-shape-izing and light transmittance is attained and it does not use a polarization division plate, aiming at improvement in brightness and an angle of visibility (example 2 of a comparison).

[Translation done.]

* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The optical member characterized by consisting of a layered product of the optical compensation polarizing plate which comes to support the birefringence layer which consists of a discotheque liquid crystal polymer in the transparent protection layer which covers a polarization film, and the polarization division plate which divides the incidence natural light into the reflected light which consists of polarization, and the transmitted light.
[Claim 2] The optical member which consists of what has a birefringence layer on the outside of transparent protection layer which consists of a cellulose system film which covers the polarization film with which an optical compensation polarizing plate consists of iodine or a polyvinyl alcohol system oriented film of dichromatic dye content in claim 1.
[Claim 3] The optical member which is that to which a polarization division plate becomes one side or the both sides of a transparence base material from the circular polarization of light division plate by which it comes to attach a cholesteric-liquid-crystal polymer layer and quarter-wave length plate more than one layer or two-layer in claim 1 or 2.
[Claim 4] The optical member which comes to paste up an optical compensation polarizing plate and a polarization division plate through an adhesive layer in claims 1-3.
[Claim 5] The liquid crystal display characterized for the optical member according to claim 1 to 4 to which a polarization film is located between a birefringence layer and a polarization division plate by the thing of a liquid crystal cell which it comes to arrange in one side at least through the birefringence layer side.

[Translation done.]

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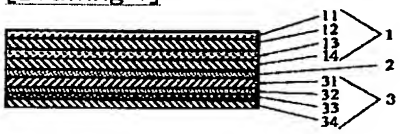
DRAWINGS

[Drawing 1]



[Translation done.]